FLORIDA ATLANTIC UNIVERSITY
DIVISION OF RESEARCH
FALL 2021

OWL RESEARCH & INNOVATION

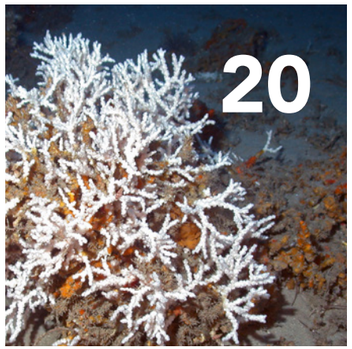
Watching the World Warm Up

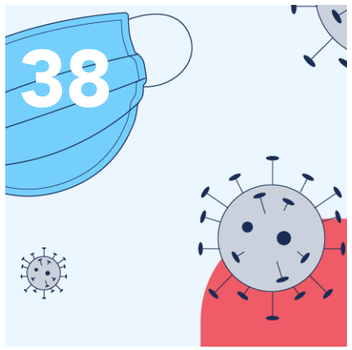
The Changing Face of Climate Science

50 FAU Harbor Branch Celebrates Five Decades

Cancer Center of Excellence Designation

FALL 2021





NEWS BRIEFS

INSIGHTS

NEW FACE

MORE

Cover: FAU scientists are involved in a variety of climate science-related research to help save our world.

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FEATURES

FLORIDA ATLANTIC UNIVERSITY
DIVISION OF RESEARCH

OWL RESEARCH & INNOVATION

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Facing Down Global Threats

JEFFREY THOLL

There are few existential threats that require a significant effort by all of humanity. Over the past several years, the long-term impacts of one of them — climate change — has come into focus, thanks in part to scientists at Florida Atlantic University and many others around the world. And even though we knew about the possibility of the second one — a global pandemic — one overtook much of our daily lives with little warning.

What's clear about climate change and the COVID-19 crisis is that researchers tackling these ultra-complex issues will help ameliorate the impacts to our environment, health and economies. I'm proud to say that FAU faculty, staff and students are doing their part to find solutions. Throughout this issue of *Owl Research & Innovation*, you can read about some of their world-changing work.

For example, John Reed at FAU's Harbor Branch Oceanographic Institute discovered a unique underwater coral reef system off the coast of Florida. His work led to the world's first marine protected area for deep-sea coral, preserving this irreplaceable biological system. Harbor Branch celebrates its 50th anniversary this year and John has been there almost the entire time.

Scientists at FAU Harbor Branch also are central to understanding the harmful algal blooms that plague much of our state, as well as waterways around the world. Additionally, the FAU Center for Environmental Studies is helping residents from South Florida to Georgia learn about coastal resilience in the face of rising seas.

Beyond our oceans and environment, many FAU researchers quickly took up studies related to COVID-19 as the pandemic bared down on us. FAU's Clinical Research Unit launched a registry and repository so scientists can investigate how the disease impacts the vast majority of people who were infected but didn't need hospital care. In addition, a number of federal agencies awarded FAU scientists with large research grants for other pandemic-related studies.

Our faculty have stood up to the challenges of our times — again and again. We all can take pride in that. You'll learn about a few of those endeavors in the pages of this magazine.

Stay safe, and Go Owls!

John Kelly, President

Go 'Team AI'

New Center Aims to Build Teamwork in AI

By John Tibbetts

ISTOCKPHOTO.COM / HALLOJULIE, METAMORWORKS

FAU's College of Engineering and Computer Science recently unveiled the Center for Connected Autonomy and Artificial Intelligence (AI), a cutting-edge facility designed to accelerate the development of innovative solutions for teamwork in AI.

"The future of AI is developing numerous devices or agents that learn together and collaborate so they can safely solve problems," said Dimitris Pados, Ph.D., founding director of the FAU Center for Connected Autonomy and AI, and professor in the department of computer and electrical engineering and computer science.

The new center, housed in the Engineering East building on the Boca Raton campus, brings together FAU's expertise in AI, supercomputing, sensing tools, big data analytics and autonomous technologies.

A new "Team AI" approach will allow connected robots and other devices to perform tasks too costly, impractical or dangerous for human teams in space, air, surface or underwater environments.

"Think about future search-and-rescue operations with robots and other AI agents connected by wireless communications," said Pados, a fellow in the Institute for Sensing and Embedded Network Systems Engineering and the Charles E. Schmidt Eminent Scholar in Engineering.

"The machines will have to make crucial decisions as a unit for each operation," he said. "They must decide how to collaborate to solve problems, but also how to split up their tasks so they can conduct a safe rescue in minimal time."

The research center will develop autonomous, resilient machine-to-machine wireless communications. "We need to find the best ways for devices to communicate with all members of the team," Pados said. "We want to avoid the cocktail party effect of everyone talking at the same time."

A second goal of the center is to develop AI software and data analytics that can train numerous connected devices to learn and work together. Third, scientists will develop software for a connected team's operational stages, allowing devices to perform jobs safely and securely.

"Connected AI will open up a lot of new avenues and technologies," Pados said. "Imagine a future when multiple machines can autonomously self-connect, talk to each other, and learn and operate as a single unit."♦

DID YOU KNOW?

© HANNAH DEADMAN

Researchers assessed the health of gopher tortoises, including these two hatchlings, at two sites in southeastern Florida.

HARRIET L. WILKES HONORS COLLEGE AND **HARBOR BRANCH OCEANOGRAPHIC INSTITUTE**

Health Check on Gopher Tortoises

Researchers from the Harbor Branch Oceanographic Institute and Harriet L. Wilkes Honors College, conducted a comprehensive health assessment of a group of gopher tortoises at two sites in southeastern Florida, FAU Harbor Branch in Fort Pierce and Loggerhead Park in Juno Beach.

For the study, the team collected blood, nasal and oral samples, along with swabs of the digestive, reproductive and urinary tract openings from 91 tortoises. The samples were analyzed for infectious diseases.

Results of the study, published in the journal *Conservation Physiology*, showed that overall, 42.9% of all tortoises tested had circulating antibodies to an infectious bacterium that causes upper respiratory tract disease, and 13.2% of tortoises had other forms of physical abnormality noted during physical examination, including limb, eye and shell abnormalities or extra scutes on the tortoise's shell.

CHARLES E. SCHMIDT COLLEGE OF MEDICINE AND **CHARLES E. SCHMIDT COLLEGE OF SCIENCE**

Snail Venom Saves Lives

In a new study, researchers in the Charles E. Schmidt College of Medicine and the Charles E. Schmidt College of Science, used venom from the Conus nux, a species of sea snail, as a remedy to potentially treat malaria. The snail produces a venomous toxin aimed at counteracting the pathology of severe malaria.

For the study, researchers collected Conus nux samples off the Pacific coast of Costa Rica. The results, published in the *Journal of Proteomics*, reveal their ability to disrupt protein interactions in the body that directly contribute to the disease.

Conus nux, a species of sea snail.

© FRED PFLUEGER, PH.D.

Cristobal Salinas Jr., Ph.D., associate professor in the College of Education and co-author in the study.

COLLEGE OF EDUCATION

Latin Masculinity (Re)Defined

Researchers in FAU's College of Education recently explored how Latino male college students make meaning of their masculinity and how this meaning shapes their understanding and performance of leadership.

Participants in the study expressed their understanding of leadership as a strong relationship between the performance of masculinity and the Latino family, as defined by "familismo" — a shared responsibility, solidarity and loyalty within the family construct.

The findings, published in the *International Journal of Leadership Education*, reveal that "familismo leadership" is a form of leadership practiced by Latino men, which is related to how they define masculinity as a form of strength, how they identify the role of provider as a form of leadership, and how they consider the performance of leadership as direct action.

CHRISTINE E. LYNN COLLEGE OF NURSING

A Digital Health Divide

A study led by researchers in the Christine E. Lynn College of Nursing examined the extent of computer ownership, internet access and digital health information use in older African American, Afro-Caribbean, Hispanic American and European American people. Some participants expressed frustration with a lack of access to digital health information, while others critiqued information received from providers.

Results of the study, published in the *Journal of Racial and Ethnic Health Disparities*, revealed a deep digital health divide within the older population. Participants who were older, less educated, economically disadvantaged and from ethnic groups were up to five times less likely to have access to digital health information than those who were younger, more highly educated and had a higher income.

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE AND **I-SENSE**

NASA Grant Awarded

A team of FAU researchers from the Harbor Branch Oceanographic Institute and the Institute for Sensing and Embedded Networks Systems Engineering (I-SENSE) received a three-year, $736,000 grant from the National Aeronautics and Space Administration (NASA), to use satellite images and hydrodynamic modeling to help study the structure and function of the Earth's system.

The goal is to demonstrate the ability and utility of remote sensing as an observational technique for characterizing the potentially critical, but often neglected, carbon cycle processes related to marine sediments.

FAU is one of only 10 universities in the nation and the only university in Florida to receive this grant in support of NASA's Science Mission Directorate in seeking a better understanding of the ocean's role in the Earth's system.

HARBOR BRANCH OCEANOGRAPHIC INSTITUTE

White-spotted Eagle Rays

© KIM BASSOS-HULL

Breanna DeGroot and Matt Ajemian, Ph.D., FAU Harbor Branch, with a white-spotted eagle ray.

A team of scientists led by Harbor Branch Oceanographic Institute are the first to conduct a multiyear study examining large-scale movements of white-spotted eagle rays in U.S. waters. Along with collaborators from the College of Engineering and Computer Science, the team is also the first to use passive acoustic technology to characterize how white-spotted eagle rays consume hard-shelled mollusk prey, like clams and snails, in a controlled environment.

Between 2016 and 2018, scientists fitted 54 rays with acoustic transmitters and tracked them using collaborative acoustic telemetry networks. Results of the study, published in the journal *Marine Biology*, reveal striking differences in travel patterns on the Atlantic coast eagle rays that preferred to be homebodies compared to the Gulf coast eagle rays that wanted to roam the ocean floor.

To capture their shell crushing sound, the scientists monitored underwater sounds using acoustic recorders. Their findings published in the *Journal of Experimental Marine Biology and Ecology*, reveal that using this technology, prey types could be distinguished based on acoustic features and they could determine what a predator is eating based on how it sounds.

COLLEGE OF SOCIAL WORK AND CRIMINAL JUSTICE

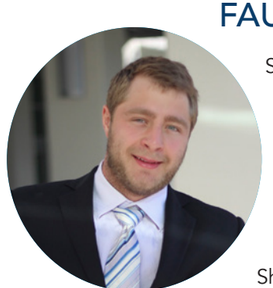
First National Findings on Cyberbullying

Sameer Hinduja, Ph.D., a professor in the College of Social Work and Criminal Justice, and co-director of the Cyberbullying Research Center, recently released results of the first-ever nationally representative survey focused on instances of cyberbullying among tweens, ages 9 to 12. The study, launched as part of the Cartoon Network's award-winning Stop Bullying: Speak Up initiative, found that one in five tweens have experienced cyberbullying in some way: either by witnessing cyberbullying having been cyberbullied themselves or by cyberbullying other teens.

In response to the research, Cartoon Network created its first-ever, parent-targeted social content illuminating key findings from the study along with tips from the Cyberbullying Research Center for parents to help their children identify and stand up to cyberbullying.

COLLEGE OF BUSINESS AND TECH RUNWAY

FAU Graduate Secures $290M



Jan Bednar

ShipMonk, a South Florida company created by FAU College of Business graduate Jan Bednar, recently secured $290 million in financing from Boston-based Summit Partners.

Summit will become a minority investor in the business, which will use the capital for research and development, hiring, international expansion and other pursuits. Bednar originally funded the fledgling business with prize money from winning such contests as FAU's Business Plan Competition and with assistance from FAU Tech Runway.

ShipMonk employs 1,000 people and plans to add 500 more in the next year. It expected to generate more than $140 million in revenue in 2020, achieving annual growth in excess of 100%.

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COLLEGE OF BUSINESS AND THE FAU WAVE

Competition Winners

Paris Prince and Aiden Natalie, are two students who earned top spots in two of FAU's annual business-related competitions. These contests award budding entrepreneurs seed money for business ventures.

Natalie is an undergraduate in the College of Business, and took first place in the 13th annual Business Plan Competition for his Marine Connex app, which helps boaters find available services near them. He built a prototype for the competition and plans to use the prize money to further develop the product and test market it. His app also won second place in the Division of Research's annual FAU Wave competition. Natalie is also now a part of Tech Runway's Venture Class 9. He is the founder and CEO of Marine Connex.

Paris Prince, a student at FAU High School and in the Charles E. Schmidt College of Science, took second-place in the annual Business Plan Competition, for her creation of SPods, an innovation that allows users to wash hands without the use of any external water supply. Her invention also won first place in the FAU Wave competition for the second consecutive year, as well as first place in the state's annual MuniMod competition.

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

New Video Technology

Borko Furht, Ph.D., and Hari Kalva, Ph.D., both professors in the College of Engineering and Computer Science, recently built a new novel technology that dramatically shrinks video files into smaller sizes, while improving the viewing experience. The patent-pending innovation was recently acquired by Japanese industry giant Mitsubishi Electric Corporation.

The new technology provides faster, more accurate estimates of motion in a video. A single background image can be matched and placed into several frames, saving file space.

DOROTHY F. SCHMIDT COLLEGE OF ARTS AND LETTERS

Caught on Film

© FAU PRIMATOLOGY LAB

A male dryas monkey peers into one of the camera traps placed on a tree in the Democratic Republic of the Congo, resulting in what appears to resemble a primate "photo bomb."

Using non-invasive research and no-flash camera traps from 2014 to 2019, Daniel Alempijevic, a doctoral student, and Kate Detwiler, Ph.D., an associate professor, both in the Dorothy F. Schmidt College of Arts and Letters, captured images of the endangered dryas monkey in the African Democratic Republic of the Congo.

Dryas monkeys weigh between five to seven pounds, and live in the dense vegetation of the Lomami National Park, making them difficult to detect. The scientists' findings, published in *Oryx — The International Journal of Conservation*, indicate that Lomami National Park and its buffer zone contain the greatest extent of the species' known range, and Lomami is the only national park with a confirmed population.

Funding Neuroscience

Inspirational Donor Gives $10M

By Bethany Augliere

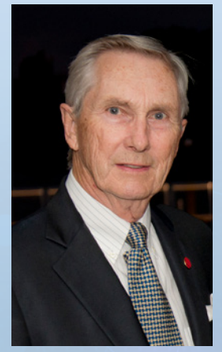
CONCEPTUAL RENDERING

For philanthropist and wealth manager David J. S. Nicholson, the brain is the most complicated computer known to mankind. "It's one of the last unsolved frontiers of science," he said.

So, to support research efforts, as well as educate the next generation of neuroscientists, Nicholson gifted $10 million to FAU's John D. MacArthur Campus in Jupiter.

Inspired by the launch of Sputnik (world's first artificial satellite) in 1957, Nicholson knew from a young age he wanted to be a part of the technological future. "I've always thought that science is really the root word of, or you can call this the stem of, all improvements in the quality of our lives," he said.

He earned a degree in electrical engineering from Queen's University in Canada. He launched his own investment firm in 1978 and the Stiles-Nicholson Foundation in 1992. "As the mission of our foundation unfolded, and we grew, it became apparent that there was a major crisis and shortfall in education, as it related to the STEM fields and science in particular."



David J. S. Nicholson

His $9.22 million gift supports the new neuroscience building currently under construction that will now be named FAU's Stiles-Nicholson Brain Institute. His gift also establishes the David J.S. Nicholson Distinguished Professorship in Neuroscience in honor of Randy Blakely, Ph.D., institute executive director, the David and Lynn Center for Neurodegenerative Disease Research and the Stiles-Nicholson STEM Teacher Academy. In addition, his gift established the Institute's ASCEND (Advancing STEM Community Engagement through Neuroscience Discovery) program and provides for its ongoing funding, bringing the total of Nicholson's gift to $10 million.

"The gift allows for the creation of a world-class research facility, one that will return on the investment made by David Nicholson, FAU and the state of Florida many fold in terms of research success, recruitment of top faculty and trainees, as well as new opportunities, through our community education programs, to broaden awareness of the exciting brain research being done right here in Palm Beach County," Blakely said.

Here's what Nicholson said about his donation to FAU:

Q: Why were you inspired to donate to the FAU neuroscience and ASCEND program, specifically?

A: I'm vice chairman of the Board of Trustees for the South Florida Science Center and Aquarium in West Palm Beach. Our foundation was a major sponsor of a permanent exhibit called the Journey Through the Human Brain and collaborated closely with Randy during its development. I got to know Randy over that period of time along with his ASCEND program. Our Foundation subsequently initiated support for the ASCEND program as it was a STEM neuroscience outreach program to elementary, middle and high school students to show them the wonders of the discoveries in neuroscience. For 28 years, I have been very supportive of public education and public higher education, especially in Florida.

Kids may only be 25% of our population but they are 100% of our future. Educating them is our best investment, especially in science.

Q: Are there any people that played a part in this decision?

A: FAU has excellent leadership and that goes right up to the top. John Kelly, Ph.D., (FAU president) has established these different focus areas, one of which is the Brain Institute. In addition to outreach, the Jupiter campus is a neuroscience hub, and the new institute can support the research endeavors that Randy Blakley, PhD., executive director of the newly christened institute, wants to undertake.

Q: What do you hope, aside from supporting research and education, comes from this gift?

A: I'm hoping that this might inspire others to do likewise, to think about giving back, and giving back to education and back to science. ♦

Stiles-Nicholson Brain Institute Pilot Grant Awards

The Stiles-Nicholson Brain Institute recently announced its 2021 Pilot Grant Awards. This year's awards, totaling more than $100,000 in research investments, represent the efforts of researchers from multiple departments, colleges and campuses.

Here's a look at the awardees:

- **Sailajah Allani, Ph.D.**, **Herbert Weissbach, Ph.D.**, **Waseem Asghar, Ph.D.**, **James Kumi-Diaka**, Center for Molecular Biology and Biotechnology, departments of chemistry and biochemistry, computer and electrical engineering and computer science and biological science
- **Ceylan Isgor, Ph.D.** and **Vijaya Iragavarapu-Charyulu**, department of biomedical science, Charles E. Schmidt College of Medicine
- **Nancy Jones, Ph.D.** and **Krystal Mize, Ph.D.**, department of psychology, Charles E. Schmidt College of Science
- **Cheryl Krause-Parello, Ph.D.** and **Beth Pratt, Ph.D.**, Christine E. Lynn College of Nursing and Institute for Human Health and Disease Intervention, and **Christine Spadola, Ph.D.**, Phyllis and Harvey Sandler School of Social Work, College of Social Work and Criminal Justice
- **Robert Stackman, Jr., Ph.D.**, department of psychology, Charles E. Schmidt College of Science
- **Carmen Varela, Ph.D.**, department of psychology, Charles E. Schmidt College of Science

INSIGHTS

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TEACHING A CAR TO READ EMOTIONS

One Researcher Patents how Autonomous Vehicles Should Respond to Passengers' Emotions

By Shavantay Minnis

For autonomous vehicles to gain the trust of their drivers and passengers, the vehicles need to understand or trust human emotions, according to Mehrdad Nojoumian, Ph.D., an associate professor in the College of Engineering and Computer Science, and director of FAU's Privacy, Security and Trust in Autonomy Lab.

Building that trust is behind Nojoumian's new patented technology, which allows an autonomous vehicle to perceive a driver's or passengers' emotions and react accordingly.

The patent, titled Adaptive Mood Control in Semi- or Fully-Autonomous Vehicles, utilizes non-intrusive sensors in autonomous vehicles to perceive the mood of the drivers and passengers. Information is collected based on facial expressions, sensors within the handles/seats and thermal cameras among other monitoring devices. Additionally, the adaptive mood control system contains real-time machine-learning mechanisms which will continue to learn the driver's and passengers' moods over time. The results are then sent to the autonomous vehicle's software system allowing the vehicle to be responsive to perceived emotions by choosing an appropriate mode of operations, like normal, cautious or alert driving mode.

"The uniqueness of this invention is that the operational modes and parameters related to perceived emotion are exchanged with adjacent vehicles for achieving objectives of the adaptive mood control module," he said.

To develop the technology, Nojoumian and his team studied trust between humans and autonomous vehicles using a self-driving car simulator with 360-degee realistic videos from roads and highways in South Florida. The videos were incorporated into a virtual reality simulator with a motion chair to replicate the car movements. The simulator exposed 100 human subjects to a sequence of normal, trust-building, or trust-damaging scenarios in two rounds of data collections, such as being cut off by another car or having to abruptly stop due to an upcoming accident. This allowed the simulator to perceive the emotional state of the human during data collection, and responsively adjust actions.

Before coming to FAU, Nojoumian was an assistant professor at Southern Illinois University, researching trust and security in robotics. He earned his doctoral degree in computer science from the University of Waterloo in Ontario, Canada, in 2012, and his master's degree in computer science from the University of Ottawa in 2007.

Mehrdad Nojoumian, Ph.D.

ALDO E. FRIAS

After spending time working on theoretical models of trust, he said, he was ready to dive into his first research questions, like can you make a controller for a self driving car, how can you ensure that a passenger's trust of a car would be sustainable over time.

"Human-AI/autonomy interaction is in the center of attention by academia and industries, and more specifically, trust between humans and AI/autonomous technologies plays a critical role in this domain because it will directly affect the social acceptability of these modern technologies," Nojoumian said. "I know this is something that will revolutionize the AI and autonomous industries, and I am truly proud that Florida Atlantic University is behind this cutting-edge technology." ♦

Unlocking Cancer Research

Florida Cancer Center of Excellence Designation Catalyzes Research

By Judy Gelman Myers

Now's the right time and place for cancer researchers at FAU. The university's collaboration with Memorial Cancer Institute (MCI) as a Florida Department of Health Cancer Center of Excellence (CCE) will initiate new areas of research at the university, from basic to clinical. Some research is already underway, such as unlocking the biology of breast cancer metastasis to the bone, developing new models of pancreatic cancer, and testing the efficacy of lung cancer drugs.

MCI, part of the Memorial Healthcare System (MHS), is one of the largest cancer centers in Florida, treating more than 4,300 new cancer patients a year — a statistic that will take on new meaning with the designation of CCE and partnership with FAU.

"The Florida Department of Health Cancer Center of Excellence designation has enabled us to elevate our cancer program from a large community system to an excellent academic center," said Luis Raez, MD, medical director and chief scientific officer, MCI. "Our partnership with FAU will enhance translational cancer research, providing even more diagnostic and therapeutic options to our patients." Raez will co-direct the MCIFAU CCE with Gregg Fields, Ph.D., executive director of FAU's Institute for Human Health and Disease Intervention.

MCIFAU, as the partnership is called, has two additional member institutions: The Scripps Research Institute and Gift of Life Marrow Registry, whose focus is blood cancer.

The breadth of the four institutions' combined expertise enables MCIFAU CCE to span the dynamics of the cancer universe, from research to health care delivery. "Our collaboration covers a broad range of areas, taking you from very basic through applied research while integrating the patients in terms of their knowledge of cancer and treatments," Fields said, indicating that research areas will be determined largely by the patient population and focus of treatment at MCI.

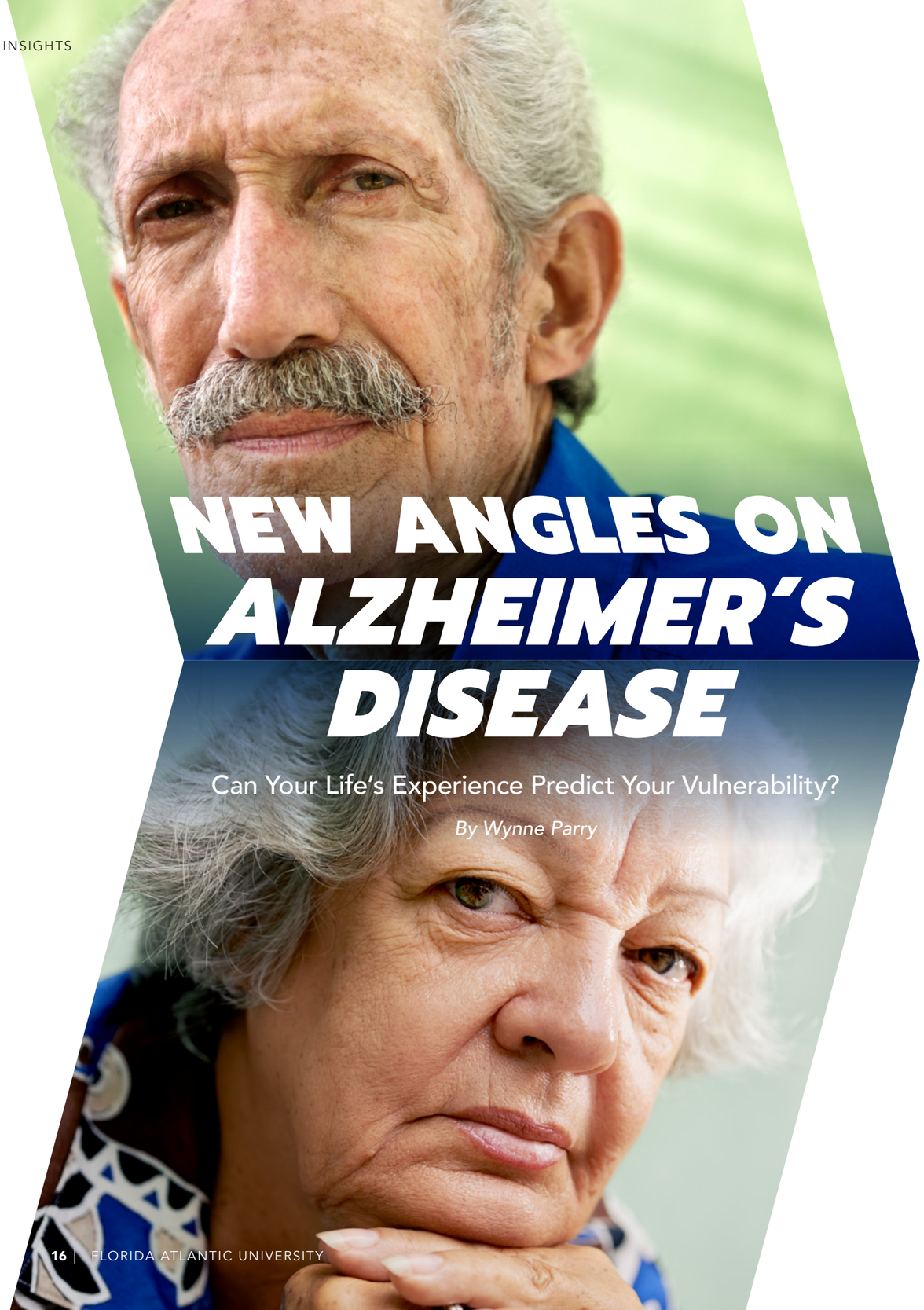
Projects are already underway. FAU, MCI, and Cold Spring Harbor Laboratory (CSHL) in New York are collaborating to expand CSHL's collection of pancreatic cancer organoids — the most extensive in the world, according to Fields. CSHL was having trouble obtaining tissue samples from diverse patient populations, and they approached FAU for help. FAU contacted MCI's pancreatic cancer surgeon, who agreed to send newly removed tumors to FAU's Boca campus, where the tumors are preserved and categorized, then sent off to CSHL.

Another project is currently making headway in Fields' lab, where researchers are investigating the biomolecule that catalyzes breast and multiple myeloma tumors to form cells that degrade the bone and allow the tumor to spread there. They've been able to show that inhibiting that biomolecule slows the process down. To that end, they're working on developing better inhibitors. MCI is collaborating with FAU on starting a repository of breast cancer biospecimens obtained from patients at MCI; the specimens will be used to further test the efficacy of the compounds developed in Fields' lab.

The expanded field for cancer research is open to members of the FAU community at every level, from undergraduate to directors of the university's other research institutes. A number of undergraduates are already hard at work on both the pancreatic cancer and breast cancer metastasis projects, with the latter effort also engaging postdocs. "We have all types of talents on these projects, and we try to engage people on all levels," Fields said.

Fields is looking at next steps too, such as working with drug companies to conduct phase I and II clinical trials in addition to Phase III trials already being conducted at MCI; tackling glioblastomas with a team from FAU's Stiles-Nicholson Brain Institute, Scripps and possibly the Max Planck Florida Institute for Neuroscience; and expanding FAU programs and degrees, such as medical physics, where novel applications of radiotherapy are applied.

"The Florida Department of Health's designation of MCIFAU as a CCE is not only a tremendous honor but a recognition of the research talent and dedicated patient care that the members of the center offer," Fields said. "We look forward to making great strides in the areas of cancer diagnosis and treatment, development of personalized medicine approaches, and public outreach that will eventually become synonymous with MCIFAU CCE." ♦



NEW ANGLES ON ALZHEIMER'S DISEASE

Can Your Life's Experience Predict Your Vulnerability?

By Wynne Parry

2X@ISTOCKPHOTO.COM / DIEGO_CERVO

Researchers know advancing age and genetic variation can increase susceptibility to Alzheimer's disease. Some, however, are wondering how a person's life experiences — specifically culture and language — might contribute.

Postdoc Idaly Vélez-Uribe, Ph.D., and her mentor neuropsychologist Mónica Rosselli, Ph.D., are working to understand how a unique set of such factors shared by many Hispanics might affect their vulnerability, or resistance, to the devastating decline in brain function associated with Alzheimer's.

In spring 2021, Vélez-Uribe was among four FAU researchers to receive funding from the Florida Department of Health's Ed and Ethel Moore Alzheimer's Disease Research Program. These grants support early-stage projects and, in Vélez-Uribe's case, professional training for new investigators. The two-year, $99,051 grant will aid her goal of becoming an independent researcher.

Decades of intense scientific effort has so far yielded only relatively modest improvements in treatment for Alzheimer's, an irreversible brain disease that is among the most common causes of death in the United States. Meanwhile, the stakes continue to rise as the American population ages.

Researchers at FAU are attacking the problem from many angles, a handful of which are represented in these grants. For their part, Vélez-Uribe and Rosselli are working on a federally funded project, called the 1Florida Alzheimer's Disease & Research Center, which recruits patients for long-term studies. This center includes a collaborative network of investigators from the University of Florida, University of Miami, FAU, Florida International University and Mount Sinai Medical Center.

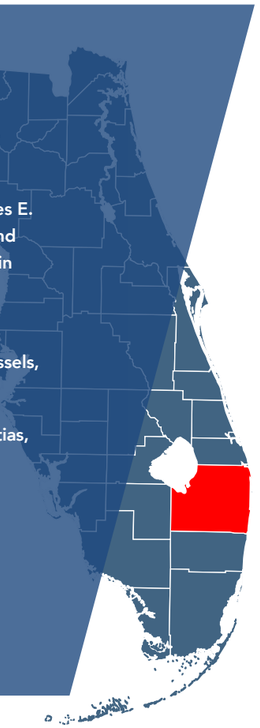
While much previous research has focused on white, non-Hispanic patients at the expense of other groups, half of those enrolled by the center are Hispanic. This representation matters because Hispanics, like African Americans, have higher rates of Alzheimer's.

EARLY DETECTION IN RURAL REGIONS

Lun-Ching Chang, Ph.D., an assistant professor and lead biostatistician in the Charles E. Schmidt College of Science, recently earned a $6.6 million grant, to help identify and characterize unique genetic features of Alzheimer's disease and related dementias in multicultural, underserved rural populations.

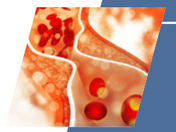
In rural regions, people are at a higher risk for Alzheimer's disease and related dementias, as well as the associated conditions that impact the heart and blood vessels, Chang said.

The research project will compare the frequency of Alzheimer's and related dementias, particularly conditions arising from stroke and other vascular brain injuries that cause significant changes to memory, thinking and behavior, between older adults living in western rural areas and those dwelling in urban or suburban areas of Palm Beach County. Ultimately, Chang said he hopes to identify the factors which may contribute to health disparities in these two groups.

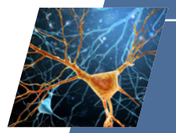


NEW IDEAS, NEW HOPE

In April, the state's Ed and Ethel Moore Alzheimer's Disease Research Program awarded a total of $641,818 to the university. In addition to funding for Vélez-Uribe and Rosselli, the grants are supporting the following research projects:



Growing evidence suggests that cholesterol deficiency may contribute to aging-associated brain disorders including Alzheimer's. Qi Zhang, Ph.D., in the Charles E. Schmidt College of Medicine, is investigating whether or not rebalancing brain cholesterol can reduce or even reverse neurological degeneration.



Using cells in culture and mice, Howard Prentice, Ph.D., in the Charles E. Schmidt College of Medicine, will investigate the ability of sulindac, a nonsteroidal anti-inflammatory drug, to protect against harmful neurological changes that occur in Alzheimer's.

Researchers in the Charles E. Schmidt College of Science, will use fruit flies to explore the mechanisms by which neurological degeneration occurs in Alzheimer's and to identify how it is controlled at the genetic level.

What's more, Hispanics are the most rapidly growing racial or ethnic group in the country.

"Nowadays, we know a lot about what's going on in the brains of people who develop Alzheimer's as they age," said Rosselli, a professor of psychology in the Charles E. Schmidt College of Science. "We're interested in what the aging process looks like in Hispanic people, both those who develop Alzheimer's and those who don't, and how it differs from other ethnic groups."

In their research, she and Vélez-Uribe look for links between features of the brain, such as the size of certain regions within it, and cognitive function, which could be, for example, the ability to recall the right word, to remember facts or events, or perform activities necessary for daily living. They also investigate how these attributes may vary for older people of different ethnicities or who speak two languages.

Rosselli and Vélez-Uribe suspect that experiences common among Hispanics — such as the stress of resettling in a new country, a culture of family involvement and the ability to speak both English and Spanish — might alter their risk for abnormal cognitive decline and dementia, including that seen in Alzheimer's. For example, some research suggests that bilingualism has a protective effect on the aging brain, a controversial possibility they are currently investigating.

Vélez-Uribe began researching Alzheimer's after first studying the neuropsychology of bilingualism in younger people, an interest motivated by her own experience as a Spanish speaker. In her native Colombia, she could not tolerate the crass humor of the cartoon South Park. But her reaction changed when she watched the show in English. "I saw my husband watching it, and I found myself interested. I was even able to laugh at the jokes," she said.

The experience became the basis for her master's and doctoral research, which found evidence that bilingual people experience emotions less intensely in their second language. The move to Alzheimer's felt like a natural continuation of this work in cross-cultural neuropsychology, Vélez-Uribe said. ♦

Research that Never Rests

Searching for Answers to Chronic Fatigue Syndrome

By Kristine M. Gobbo

"There has long been speculation of viral causes for chronic fatigue syndrome."

– Dawei Li, Ph.D.

Dawei Li, Ph.D., recently joined FAU as an associate professor and director of genomic medicine in the Charles E. Schmidt College of Medicine. At the forefront of genetic research, he's identified genes related to a number of psychiatric, behavioral and addictive disorders.

Invited to a conference on chronic fatigue syndrome three years ago, Li was captivated by the subject matter examined by each speaker. Fascinated by the mysteries of chronic fatigue syndrome, in between conference sessions, he sought out the life stories of patients impacted by the disease. He could see in their eyes their urgent need to find the cause and a cure.

Since then, Li's focus has shifted to chronic fatigue syndrome, which is a multisystem disease involving the immune system and brain. Currently, there are no diagnostic biomarkers, FDA-approved treatments, nor cures for this condition. Its cause remains unknown.

Li is now building an FAU research team that includes faculty, graduate students and community partners.

Prior to his time at FAU, Li was an assistant professor in the department of microbiology and molecular genetics at the University of Vermont. His journey began at Shanghai Jiao Tong University in China, where he earned a doctorate in genetics (bioinformatics). He furthered his education as a postdoctoral associate in statistical genetics at Rockefeller University then as an associate research scientist in genomics and bioinformatics at Yale University.

It was FAU's investment in genomic medicine research that lured Li to Florida. He brings with him two grants from the National Institutes of Health and one from the U.S. Department of Defense, in addition to several other research grants.

Li's research goal is to develop and maintain a program involving "bioinformatics development, genetic risk discovery and translational medicine" into diseases, particularly for chronic fatigue syndrome. "These tools allow us to better examine the connections of endogenous retroviruses with altered immune responses, particularly observed in diseases such as chronic fatigue syndrome," Li said. "We are working on a number of innovative genomics and bioinformatics research projects to investigate new questions in the field."

COVID-19 created challenges for Li's research, but it also brought additional opportunities for examination. Li currently is also in the process of developing a new COVID-19 genomic project on FAU's campus.

"There has long been speculation of viral causes for chronic fatigue syndrome," Li said. "Many believe the original virus that triggers the disease leaves the patient's body, making it difficult to determine the cause of the illness. Many people affected with COVID do not fully recover – known as the 'long-haulers' – and develop symptoms similar to what we have seen in chronic fatigue syndrome. The large number of samples from COVID-19-affected individuals make it possible to examine viral causes in chronic fatigue syndrome and possibly other post-viral syndromes."

Chronic fatigue syndrome affects up to 2.5 million Americans and more than 20 million people worldwide. The condition is more common than multiple sclerosis, lung cancer or AIDS. It is anticipated that this number may increase significantly after the COVID-19 pandemic. "Our research may also provide clues for new chronic fatigue patients among COVID-19 'long-haulers,'" Li said. ♦

MARKING HALF A CENTURY

Five Decades of Bettering the World through Ocean Science

By Bethany Augliere

PHOTOGRAPHY COURTESY OF FAU HARBOR BRANCH OCEANOGRAPHIC INSTITUTE

FAU Harbor Branch Oceanographic Institute is celebrating 50 years of groundbreaking research and exploration to address the critical issues facing the oceans and impacting human health and well-being.

Founded in 1971, then named as Harbor Branch Foundation (HBF) and later as Harbor Branch Oceanographic Institution, the 144-acre campus along the Indian River Lagoon became a part of FAU in 2007 to expand its research and education efforts. Now, FAU Harbor Branch currently conducts about one-third of FAU's research activity, in five key areas: ocean and human health, aquaculture innovation and food security, technological innovation and national defense, marine ecosystem conservation and education and outreach. The makeup consists of more than 200 scientists, engineers, educators, staff and students.

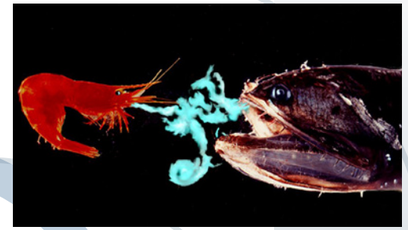
From developing new cancer therapies, to working on cutting edge aquaculture techniques for global food security, to tackling toxic algal blooms, the mission of FAU Harbor Branch is simple: Ocean Science for a Better World.

"We want to help the world," said Jim Sullivan, Ph.D., executive director of FAU Harbor Branch. "More than 70% of the Earth's surface is ocean. Our weather, our food, our very lives are dependent on the ocean."

J. Seward Johnson Sr., right, and longtime friend Edwin A. Link.

1971

Engineering division founded to improve safe ocean exploration and research.



Marine Science Division founded with focuses on deep-sea biology.

1974

Former Coast Guard cutter named "R/V Johnson" joins Harbor Branch fleet.

1973

Beginning of the Indian River Lagoon Coastal Study, the first major research project.

Part of that mission includes outreach and education efforts to foster the next generation of ocean stewards, as well as training future scientists through pre-collegiate, collegiate and graduate programs. "We're a research institute, but if no one knows what we are doing or why it's important, we're spinning our wheels," Sullivan said.

HBF was founded in 1971 by J. Seward Johnson, Sr., heir to the Johnson and Johnson pharmaceuticals fortune, who had a passion for sailing and the ocean. He teamed up with Edwin A. Link, inventor of the flight simulator, whose passion for sea exploration and engineering complemented Johnson's vision.

This partnership revolutionized deep-sea exploration as Edwin Link invented and built two Johnson-Sea-Link (JSL) submersibles in 1971 and 1975. Their two-meter diameter acrylic spheres allowed scientists a nearly 360-degree view of life down to 900 meters under the sea. FAU Harbor Branch was among three organizations in the nation, and six in the world, that ran manned deep-sea submersible research vehicles at that time. These were also the only submersibles in the world with lockout capabilities, in which divers could make dive excursions out of the subs to depths of 600 feet.

50 Years of Ocean Science for a Better World

1971 Original Johnson-Sea-Link designed with nearly 360-degree view inside the acrylic sphere to descend to 1,000 feet and support lockout diving. Operating for 40 years, with more than 9,000 dives and used by more than 3,000 scientists.

1973 First major research project, Indian River Lagoon Coastal Zone Study, begins with researchers from Harbor Branch, Smithsonian Institute, Link Foundation and Woods Hole Oceanographic Institution.

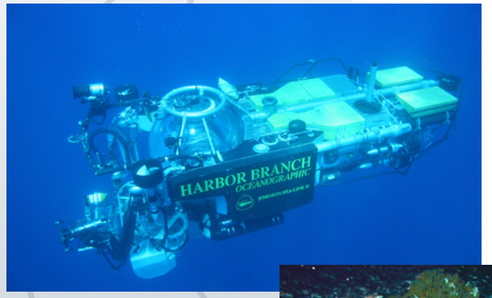
1984 92 square miles of Oculina Bank were designated as the first marine-protected area to protect deep-water reefs in the world.

1986 FAU Harbor Branch ships and JSL subs assisted the National Aeronautics and Space Administration and the U.S. Navy in locating and identifying pieces of the Challenger wreckage.

1991 FAU Harbor Branch begins aquaculture training program, teaching fisherman displaced by Florida net ban how to grow clams, sparking a large new industry.

1992 Raytheon Company contracts with FAU Harbor Branch engineering team to create the largest free-standing aluminum structure ever placed on the ocean floor.

1975



Built in 1971 and 1975, the Johnson Sea-Link Submersibles revolutionized the field of deep-sea exploration with their large, acrylic spheres which allowed a near-360-degree view of life under the sea. These submersibles were in commission for nearly 40 years, and together conducted more than 9,000 dives worldwide, led by more than 3,000 scientists.

Deepwater Oculina verrucosa reef discovered off Florida's east coast.

1978

Sampling mechanism "Critter Gitter" installed on Johnson Sea-Link for collecting organisms.

1976

Link Engineering Laboratory building and Marine Shipping Railway built.

1999 One of the Discovery Channel's highest-rated programs, "Cuba: Forbidden Depths," focused on a month-long research expedition by FAU Harbor Branch researchers to explore the waters around Cuba.

2002 FAU Harbor Branch scientists first to successfully repopulate a damaged coral reef with sea fans raised in captivity.

2007 Marine and Oceanographic Academy launches on the FAU Harbor Branch campus in partnership with Westwood High School and the St. Lucie County school district.

2009 FAU Harbor Branch selected to host the National Oceanic and Atmospheric Administration Cooperative Institute for Ocean Exploration, Research and Technology.

2010 FAU Harbor Branch assesses the impact of the Deepwater Horizon Oil Spill.

2013 FAU Harbor Branch establishes the Indian River Lagoon Observatory Network, an array of environmental sensors that measure real-time weather and water quality data in the Indian River Lagoon.

2014 FAU Harbor Branch builds the world's first ocean energy turbines for offshore testing.

Together the JSLs made more than 9,000 dives worldwide, led by more than 3,000 scientists, spanning more than three decades.

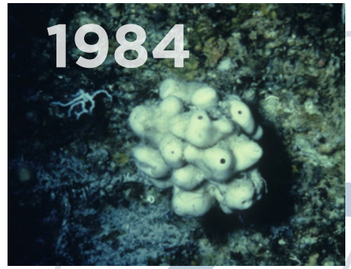
The JSLs enabled biologists, geologists, archaeologists, engineers, resource managers, educators and students to witness new species and unlock the mysteries of the deep sea.

It was these subs that helped John Reed, a research professor and principal investigator for the FAU Harbor Branch's Robertson Coral Reef Research and Conservation Program, discover the Oculina Bank, the deep-water ivory tree coral reefs off Florida's east coast, which exist nowhere else on Earth. That discovery directly resulted in the protection of fragile deep-water coral habitats, including the world's first marine protected area for deep-sea corals.

"Every time we dived with the JSLs, we saw things no one had ever seen before. We discovered new reefs, new species and new bioactive compounds," said Reed, who joined FAU Harbor Branch in 1976. Now, Reed continues to explore the reefs using advanced technologies thanks to remote sensing and automated underwater vehicles.

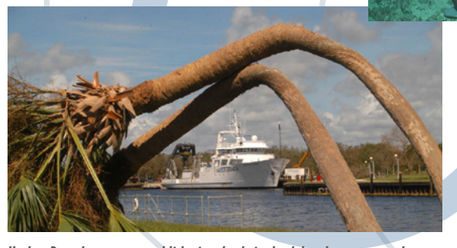
In 1984, FAU Harbor Branch launched the SeaPharm Project (now called the Marine Biomedical and Biotechnology Research (MBBR) Program) to collect marine organisms, including deep-sea sponges. Since then, scientists have amassed more than 30,000 samples of marine invertebrates and algae, and 19,000 microbial cultures to find possible disease fighting chemicals, many of which were collected by scientists while diving the JSL submersibles.

1984



Marine Biomedical Program founded to discover medicines from the ocean.

2004

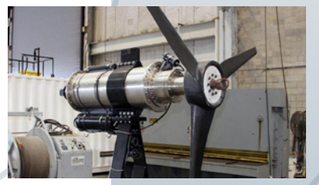


Harbor Branch campus was hit by two back-to-back hurricanes, named Francis and Jeanne, category 3 and 4 storms, causing nearly $60 million in damage, impacting many research and administrative buildings. These events led to the restructuring of the institute and the construction of several new, state-of-the-art laboratory buildings.

Eye-in-the-Sea created to document behaviors of deep-sea animals.

2010

FAU Harbor Branch assesses the impact of Deepwater Horizon Oil Spill.



2014

FAU Harbor Branch Oceanographic Institute builds world's first ocean energy turbines for offshore testing.

Scientists with the MBBR Program have found sponges that show activity against the deadly antibiotic-resistant staphylococcus bacteria, methicillin-resistant *Staphylococcus aureus* (MRSA), as well as a lesser-known bacterium that causes problems for people with cystic fibrosis and other diseases. One compound, discodermolide, a natural product from a Caribbean sponge that attacks cancer cells, made it to phase 1 clinical trial.

As a sponge expert, Shirley Pomponi, Ph.D., a research professor at FAU Harbor Branch in the MBBR program, was recruited in 1984 to help organize the sampling efforts and identify specimens that contained promising chemicals. "I have been part of a dedicated team that has discovered marine-derived chemicals that will benefit human health, and that's been extremely satisfying," she said.

Additionally, in 2019, after 19 years of trying, she was able to get a cell line from sponges – which allows her to get chemicals from the cells rather than needing to collect living sponges. To Pomponi, achieving that was like finding the Holy Grail, she said. "Now, there are all kinds of really interesting hypotheses to test," Pomponi said. For her, that means she can now help find ways to restore and conserve habitats dominated by sponges but impacted by hurricanes, disease, or algal blooms by being able to grow and plant them out in the wild by constructing mini sponges from the cells using 3D bioprinters.

For many at FAU Harbor Branch, collaboration is at the heart of opportunity. Brian Lapointe, a research professor at FAU Harbor Branch, for example, has been able to publish groundbreaking papers due to long-term data collection. Most recently, with 30 years of unique data from Looe

2015 FAU Harbor Branch researchers establish a land-based seagrass nursery, with the goal of restoring vital habitats across the Indian River Lagoon.

2016 FAU Harbor Branch researchers publish a study on Leiodermatolide, a novel marine natural product isolated from a deep-sea sponge, that shows activity against pancreatic cancer.

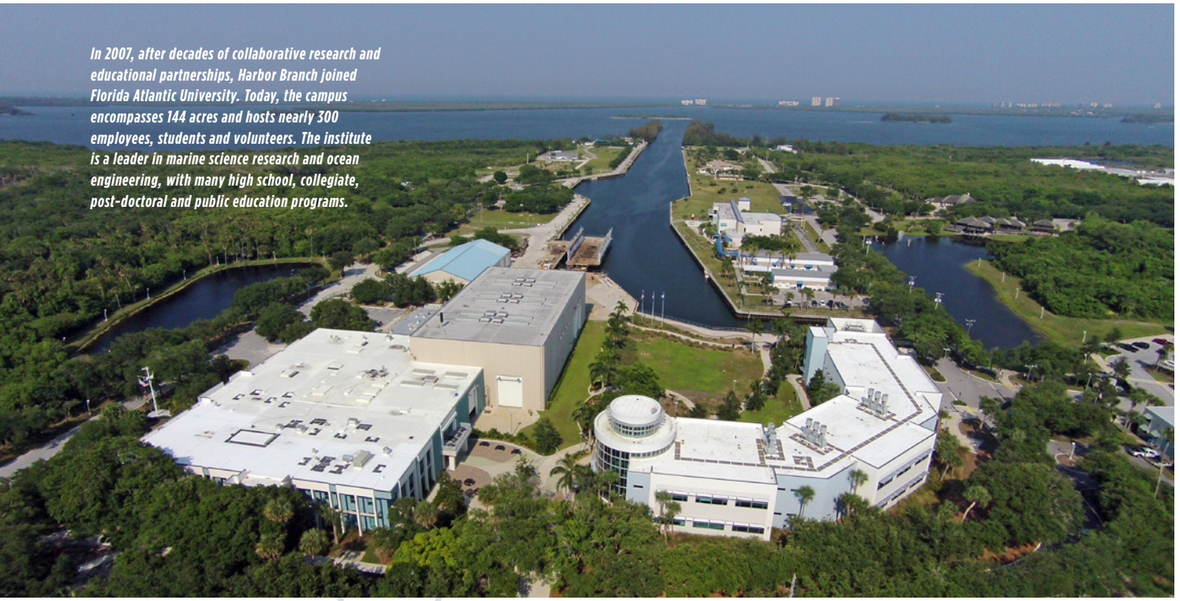
2017 FAU Harbor Branch launches the Ocean Discovery Experience, an outreach program that educates children in underserved communities about marine science through a unique partnership with the Boys & Girls Clubs of St. Lucie County.

2018 The Florida Center for Coastal and Human Health was established to fulfill an unmet scientific need of understanding Harmful Algal Blooms and their impacts.

2019 Florida Governor Ron DeSantis appoints Jim Sullivan, Ph.D., executive director of FAU Harbor Branch, to the newly established Florida Governor's Blue-Green Algae Task Force.

2019 After conducting a three-decade-long study at Looe Key, FAU Harbor Branch researchers determine that mass-coral die-offs were partly the result of land-based pollution from sewage, fertilizers and run-off water.

2020 FAU Harbor Branch aquaculture researchers are the first in the world to spawn bonefish in captivity.



In 2007, after decades of collaborative research and educational partnerships, Harbor Branch joined Florida Atlantic University. Today, the campus encompasses 144 acres and hosts nearly 300 employees, students and volunteers. The institute is a leader in marine science research and ocean engineering, with many high school, collegiate, post-doctoral and public education programs.

"Now more than ever, there is a critical need to understand the ocean, and how to best manage this complex ecosystem for the benefit of society."

—Jim Sullivan, Ph.D., executive director of FAU Harbor Branch Oceanographic Institute

Key Reef in the lower Florida Keys, he discovered that the problem of coral bleaching is not only due to a warming planet, but also because of excess nitrogen in the water. "Working at FAU Harbor Branch has afforded me the opportunity to do really unique, long-term research," Lapointe said.

Dennis Hanisak, Ph.D., who started in 1977 as a postdoctoral researcher and is now a research professor at FAU Harbor Branch and director of the Indian River Lagoon Observatory (IRLO), specializes in the study of marine plants, like seagrasses and seaweeds. For many years, Hanisak said that the plants were often overlooked, despite their importance as nursery grounds for fish and other animals. In the last few years, he created an innovative seagrass nursery, because the marine plants are disappearing in the Indian River Lagoon due to algae blooms and the ongoing pollution issues. "And flashforward now, everyone is talking about them because they're all gone, and manatees are dying because they're starving," said Hanisak, adding seagrass is the main food source of Florida manatees.

Like Lapointe, Hanisak has seen the natural world change before his eyes faster than he ever thought possible. He too worked on the Florida reef and "it died before my eyes," he said. Throughout Hanisak's career, he has seen new fields emerge like restoration ecology and conservation biology that weren't around when he started, to address these threats due to human activity.

The work of scientists like Hanisak, Lapointe and others is critical for marine ecosystem conservation. Results from these studies help inform policy makers as they develop sound conservation, management and restoration strategies to protect and save our oceans.

"Now more than ever, there is a critical need to understand the ocean, and how to best manage this complex ecosystem for the benefit of society," Sullivan said. "FAU Harbor Branch was founded in the spirit of ocean exploration to unveil the mysteries of the deep. To this day, the institute relentlessly pursues innovative ocean research, while providing top-tier educational programs that will lead us to solve the most pressing issues facing our oceans." ♦

Visit FAU.edu/HBOI for the latest on the 50th celebration.

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EYE ON EARTH

Watching the World Warm up

Researchers Keep Close Watch on the Changing Face of Climate Science to Ensure a Better Future

All Stories by Bethany Augliere

The human race is inherently connected to, and reliant upon, the environment. That connection is closer still for those living in coastal regions — like South Florida — where the effects of marine disruptions, like toxic algal blooms, hurricanes and sea level rise, profoundly impact economies, homes and human health.

At FAU, researchers dedicate their lives to creating solutions to pressures in all environments – on land, at sea and in the air. Scientists work to understand these systems, and to uncover critical climate science discoveries, ensuring changes for a better future.

Throughout the next few pages, join us on a journey into climate science research at FAU.

Predicting the Unpredictable

Researchers Deploy Tools to Better Understand Lake Okeechobee's Toxic Algal Blooms

GEOCHEMISTRY AND GEOCHEMICAL SENSING LAB

Jordon Beckler, Ph.D., tests the benthic lander in the Indian River Lagoon. The lander is capable of directly measuring the flux of nutrients from the sediments to the overlying water column.

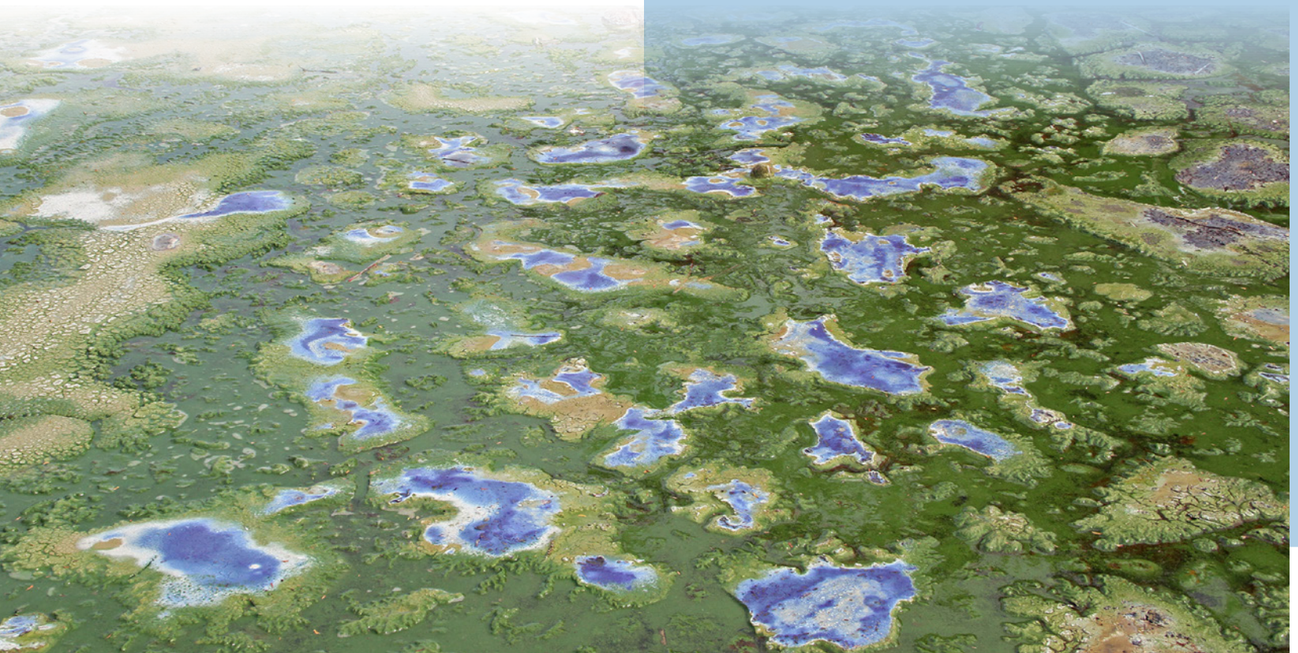
Pockets of blue-green algae blooms pop up in Lake Okeechobee each year, coating the water's surface in a toxic slime. But knowing where and when the algae appears remains a mystery. Better predicting and managing these blooms would reduce the threat on the environment, economy and human health.

Jordon Beckler, Ph.D., is leading a new multimillion dollar research effort to do just that. Beckler is an assistant research professor at FAU's Harbor Branch Oceanographic Institute and a fellow at FAU's Institute for Sensing and Embedded Network Systems Engineering.

The answer, he thinks, may lie in the lake's mucky bottom. "Let's just say the sediments are an important source of nutrients for the blooms – if not the most important," Beckler said.

With a shoreline spanning 135 miles, Lake Okeechobee, also known as Florida's Inland Sea, is the second-largest freshwater lake entirely within U.S. boundaries. Due to runoff from agriculture and development, every year the nutrient-rich waters lead to harmful algal blooms – a problem that will only get worse with warming water and changing climate. "Blooms will start earlier in the spring, last longer in the fall, and in the summer months, might grow like wildfire," said Jim Sullivan, executive director of Harbor Branch and a member of the state's Blue-Green Algae Task Force.

And, despite the fact that they occur every year, knowing when and where they will occur remains a mystery, he said. "We still don't have a good handle on the specific environmental triggers for why and when we have bad algal blooms in Lake Okeechobee."



GEOCHEMISTRY AND GEOCHEMICAL SENSING LAB

Vela, an autonomous sailboat used in the HALO project, transits around Lake Okeechobee monitoring towers owned by the South Florida Water Management District.

One particular blue-green algae, called *Microcystis aeruginosa*, is of particular concern. It produces toxins linked to skin disease, respiratory distress, liver damage and liver cancer in both animals and humans. The blooms have led to beach and waterway closures. And when the water level is high in Lake Okeechobee, discharged water can also transport these blooms and excess nutrients into the St. Lucie Estuary and the Indian River Lagoon, as well as west coast regions, potentially feeding other toxic blooms, like red tide.

Microcystis is the focus of Beckler's new multi-institute, collaborative project, called the Harmful Algal Bloom Assessment of Lake Okeechobee (HALO). While the state has existing monitoring programs, the team is augmenting this effort to better predict where and when the blooms will happen, by using highly innovative techniques to collect geochemical and biological measurements in the water and sediment. With that data, the team is using both a mechanistic, physics-driven model and a machine learning model to understand drivers and forecast future blooms. The project also includes a live, public web-based platform for visualizing the blooms: http://halo.gcoos.org/.

As the principal investigator of the Geochemistry and Geochemical Sensing Lab, Beckler's specific interest is in the overall health status of sediments and their role in the blooms, something that has largely been underappreciated, he said. "We know what healthy water is, healthy air quality and healthy soil quality. But we don't know about submerged sediments, even though they provide critical ecosystem services for aquatic organisms and vegetation."

Sediments store nutrients and release them into the water, a process potentially exacerbated from storm events like hurricanes or warmer temperatures. And in Lake Okeechobee, the sediments hold phosphorous and nitrogen nutrients from many decades of runoff, called legacy nutrients.

To study sediments, Beckler will use two different benthic landers – think lunar lander – large platforms with sensors that sit at the bottom of the lake and measure the nutrients coming from the sediments. "I can count on one hand the number of studies that have deployed sensors to continuously and autonomously monitor sediment biogeochemistry for long periods of time, let alone for harmful algal bloom monitoring," he said. "Compare this to the level of interest surrounding Internet-of-Things sensors for the purpose of monitoring soil conditions only in the last few years. In my mind, this is the type of application that has the potential to finally justify the societal and scientific recognition of the importance of sediments and their monitoring."

As part of the HALO project, the team and collaborators will also be utilizing technology to understand how light affects an algae bloom's growth, and are working with industry to develop the means to map out a bloom in two dimensions using an autonomous sailboat called Vela. The sailboat recently completed its first 10-day mission. Divers will also be collecting sediment cores from the bottom of Lake Okeechobee for subsequent lab analyses of nutrient dynamics.

"The collective level of innovative technologies assembled as part of HALO may certainly be a superlative in the current world of algal bloom and coupled environmental monitoring," Beckler said.

Ultimately, these data will give Beckler and his team a better idea of what's causing the blooms and why, so that managers can use that information to mitigate it effectively, Sullivan said, and apply that knowledge to other regions. "Because blue-green algal blooms aren't just a problem for South Florida, they are an increasing problem around the globe. This goes well beyond the borders of Florida."

UNDERSTANDING ALGAE

The 2021 explosion of harmful algal blooms in Lake Okeechobee and the Saint Lucie Estuary in southeast Florida has been gaining attention because of impacts on public health, the environment, tourism and the economy.

FAU's Center for Environmental Studies in the Charles E. Schmidt College of Science has a partnership with the U. S. Geological Survey's Greater Everglades Priority Ecosystem Sciences Program and recently developed a series of online modules that help understand the science and challenges related to algal blooms. Check it out: www.ces.fau.edu/usgs/understanding-algae/

GABRIEL ALSENAS

Testing Marine Turbines

Scientists Developing Ways to Tap the Gulf Stream For Green Energy

Tow testing Ocean Current Energy, LLC's prototype ocean current turbine offshore Fort Lauderdale, Fla.

While most people are familiar with solar or wind power, there's another promising renewable energy that harnesses ocean currents – underwater turbines. Developing and testing that technology to help bring power from these currents to our communities is the goal of FAU's Southeast National Marine Renewable Energy Center (SNMREC), said Gabriel Alsenas, director of SNMREC.

For their latest endeavor, the center envisions a $100 million project to develop a world's first ocean current turbine development and testing site off Lake Worth Beach, with a connection to the city's power grid. "This is our vision for the next five to 10 years that we're starting to build out," Alsenas said.

Known as hydrokinetic energy, the power of currents, waves and tides is an untapped source of potential carbon-free electricity in the U.S. And, here in South Florida, that source is the mighty Gulf Stream, the warm water current that originates in the Atlantic Ocean, loops through the Gulf of Mexico, and flows north along eastern coastlines at eight billion gallons per second.

SNMREC is one of only three centers designated by the U.S. Department of Energy to assist companies with the responsible development of marine renewables. Compared to Europe, the leader in tidal turbine technology, the U.S. has been slower in developing turbines. "Because of our regulatory regime here, our pace has been slower, but it's been more measured, and we're catching up," Alsenas said. Their team has worked with FAU wildlife scientists to study how animals might interact with a future turbine array, he said.

In 2020, the center achieved a renewable energy first. They partnered with a project development company to successfully test a local technologist's prototype in the middle of the Gulf Stream, producing power in the water for a continuous 24 hours. "But demonstrating 24/7 power production is just one step in the process," Alsenas said. The next step is to drag larger scale turbines behind large ships at controlled speeds, called tow-testing, then leaving the turbines in the water to run on their own and eventually, connecting them to shore with an electrical grid.

Trained as an ocean engineer, Alsenas emphasized the need for testing. "Murphy lives out there," he said (referencing Murphy's Law). "So, a phased approach to developing these technologies is the best way to reduce risk for our commercial partners and help them achieve full scale sooner."

Long-term Tracking of Wetland Birds

The Everglades Ecosystem is Critical to Survival

For the wading birds of South Florida – like wood storks, ibises, herons and egrets – the delicate water balance of the Everglades ecosystem is critical to their survival. It impacts their ability to find food during the wet season and successfully nest in the dry season.

Since 2005, scientists with FAU's Avian Ecology lab have monitored and studied the nesting colonies of these long-legged birds in the Everglades, including sites at Lake Okeechobee. As habitat loss and climate change threaten South Florida's wetlands and wildlife, the lab's research plays an important role in management and restoration efforts.

"These high nesting events were an iconic feature of this historic Everglades system, and they're indicators of the overall health of the Everglades," said Michelle Petersen, Ph.D., an assistant research professor in the Charles E. Schmidt College of Science and principal investigator of the FAU Avian Ecology Lab. "As highly managed ecosystems, this research allows us to determine if we are managing the system correctly in order to provide habitat for these birds to successfully forage and produce young."

FAU AVIAN ECOLOGY LAB

Above: A flying white ibis, which nests in the Everglades.

Below: Kate Shlepr, a doctoral student at FAU, conducts fieldwork to check on wading bird nests.

LUISA HERNANDEZ

A Georgia salt marsh. Researchers documented how communities value their salt marshes during the National Science Foundation (NSF) funded Coastal SEES projects. This project was featured in episode three of Home and High Water: *"Why Do We Care About Our Salt Marshes?"*

Home and High Water

FAU's New Science Documentary Podcast on Coastal Resilience Research in South Florida

From a flooded neighborhood street in urban South Florida to Georgia's salt marshes, FAU's Center for Environmental Studies (CES) new podcast dives into research that explores how people live, adapt and thrive in a changing climate.

CES, led by director Colin Polsky, Ph.D., is a state university research center with a mission to conduct research, education and community engagement activities related to coastal resilience, wetlands ecology and energy sustainability, including informing community-wide strategies for adapting to social and environmental changes.

It's these stories about how people are coping with climate in their daily lives, the associated research and how that research is done that are highlighted in the new podcast. Titled *Home and High Water*, the podcast name is a nod to the increasing problem of sea-level rise and flooding in South Florida, said Polsky, a professor of geosciences in the Charles E. Schmidt College of Science.

"We have all this research underway and it struck me that it's of some public interest, but it's hard to find it, or engage with it, based on scientific publications or conference presentations," Polsky said. "We're trying to provide a place where we make bite-sized presentations of what we're doing on the research side."

In the first two episodes, for instance, listeners learn about a 2019 study involving the Estates of Fort Lauderdale community in Dania Beach by Polsky and a graduate student. The researchers wanted to gauge both the vulnerability and resilience of this community to events such as flooding, severe wind and extreme heat. They surveyed 100 households questions each, ranging from their knowledge of the community's emergency preparedness to seawall installation projects.

Throughout the episodes, listeners can hear from the researchers themselves about how the work was done, to demystify that process, as well as from the people surveyed who share their personal experiences, and other experts involved in the study. Ultimately, the podcast addresses "what it means for one community, one neighborhood, facing a changing climate," said Cameron Peters, producer of the new podcast.

"There are a lot of science podcasts out there, ranging in style and length. We wanted to create a podcast that would bridge CES' coastal resilience research with the public, and so we chose to do that through a narrative style," Peters said. "People connect with stories, so hopefully someone who listens to the podcast comes away curious and wanting to learn more."

For anyone who does listen and wants to connect with the material further, each episode featured on the CES website has additional resources, including any associated scientific papers, as well as other multimedia endeavors, like videos and photo essays. "The ability for a listener to follow their curiosity and dive deeper into the material was important to us from the beginning," Peters said.

For the team, this podcast is for people who are interested in science, but also the human side of science. "Communicating science and stories through diverse voices, disciplines and perspectives is critical," Peters said. Ultimately, they hope it bridges the gap between researchers and the public and raises awareness about the issues communities face due to climate change.

Check out the podcast here:
www.ces.fau.edu/news/podcast.php

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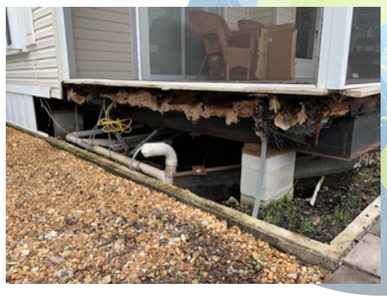
EYE ON EARTH



Photography by Leslie Kevles, Estates of Fort Lauderdale, who photographs flooding in his neighborhood during CES' photo documentary workshop on Climate Resilience in Fall 2020.

Top: "... the corner of my home showing severe damage from the incessant rains. It has damaged the wood. This is being repaired next week which keeps me up at night especially with a storm coming. I'll just hold my breath."

Above: "We see the water rising over the boat ramp in the next few days, you couldn't tell there was a ramp there."

MEASURING MANGROVES

Mangrove trees provide many ecosystem services, including preventing erosion. Now, FAU researchers from the College of Engineering and Computer Science have discovered that part of the reason lies with their roots.

Using simplified root-like models in a lab setting, the scientists tested the spacing of the roots, called porosity. They compared the area of sediment deposition behind these different configurations and found the least erosion in the patch of 47% porosity, which matches that of wild mangroves.

"It seems that mangrove roots' spacing is optimal to prevent erosion," said Oscar Curet, Ph.D., an associate professor in the department of Ocean and Mechanical Engineering. "We can use that knowledge to and learn from the design of nature and apply it to make more resilient coastal structures."

ISTOCKPHOTO.COM / DOLIMAC

Too Much of a Good Thing

© BRIAN LAPOINTE, PH.D.

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Above: Peter Barile, Ph.D., holding the red bloom-forming seaweed, Gracilaria, at Castaway Cove on the Indian River Lagoon.

Right: Brian Lapointe, Ph.D., in a sargassum mat collecting data with a video camera.

Poor Water Quality Leads to Toxic Levels of Seaweed

While harmful algal blooms of red tide and blue-green algae receive a lot of press in South Florida, there's another threat that's emerged in recent years and choking the Caribbean – Sargassum seaweed.

Brian Lapointe, Ph.D., a research professor with FAU's Harbor Branch Oceanographic Institute, has studied Sargassum seaweed since the 1980s. He's long suspected that water quality issues, due to runoff and sewage, are the cause for the increasing Sargassum blooms. Now, in a recently published study, he's confirmed that theory. Compared to the 1980s, Sargassum today has 35% more of the nutrient nitrogen in its tissues.

Sargassum seaweed is a type of floating brown algae. It drifts along the currents of the open ocean and accumulates in the Sargasso Sea, a region of the Atlantic Ocean bounded by four currents rather than land. Under normal circumstances, the seaweed provides shelter and food for an impressive array of marine life, like sea turtles, fish and crabs, as well as commercially important species like mahi-mahi, Lapointe said.

But more isn't necessarily better, as is the case with Sargassum. With increasing nutrients from rivers including the Amazon and Orinoco in South America as well as the Mississippi, Sargassum becomes a problem. Since 2011, unprecedented strandings of the seaweed have occurred over vast areas of the North Atlantic basin and Caribbean. "It's causing catastrophic problems in the Caribbean, because the massive amounts cause dead zones," Lapointe said. "When it comes ashore, it's just so much it strips the oxygen out of the water."

The excessive Sargassum blooms are contributing to the decline of coral reefs, dangerous for wildlife by smothering sea turtle nesting sites or entangling dolphins surfacing to breathe, and even a threat to human health. When the rotting, foul-smelling seaweed clogs up canals and buries the beach, it releases hydrogen sulfide, which can irritate your eyes, nose and throat, according to the Florida Department of Health. It also contains heavy metals like arsenic and fecal bacteria. For that reason, the state monitors the water quality around beaches when Sargassum is present. You won't catch Lapointe swimming at the beach during these times, he said.

For this study, Lapointe and his team collected a total of 488 samples of Sargassum between 1983 from 2019, from locations around the North Atlantic, including the Florida Keys, Gulf Stream, Sargasso Sea and reefs in Central and South America. The researchers analyzed the tissues and compared the baseline values in the 1980s to those in more recent decades. They found that nitrogen increased by 35%, while phosphorus decreased by 44%.

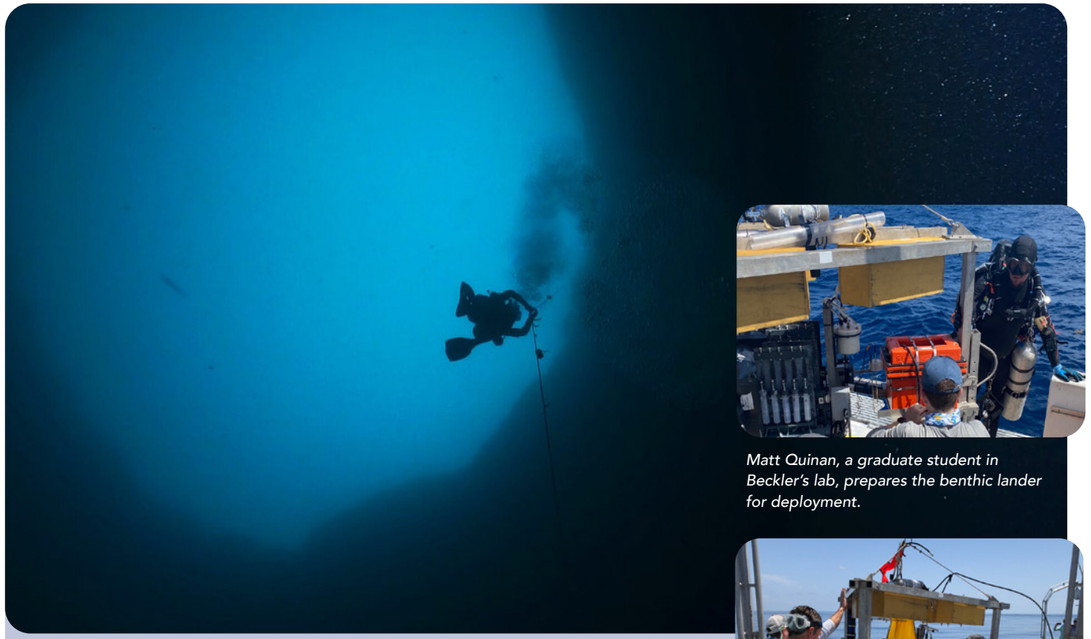
In Florida, and across the Caribbean, people are spending millions of dollars to mitigate this problem, which will likely get worse with global warming and the associated climate change, Lapointe said. With predictions including heavier rainfall and more severe storms, climate change has potential to release even more nutrients into the water, and further feeding the blooms.

The solution, Lapointe said, is to address our water quality issues locally, particularly due to septic tanks and sewage. "People talk about the fertilizer, but no one wants to talk about sewage. I've been fighting that for a long time in Florida," he said. That's slowly starting to change, however, despite being long overdue, Lapointe added. For instance, a recently approved senate bill, called the Clean Waterways Act, includes changes in wastewater treatment, reuse potable water and biosolids application.

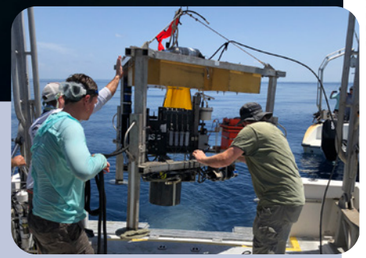
"The vitality of Florida's environment, economy and way of life is dependent on the health of our waterbodies. That's why the state prioritizes protecting and preserving Florida's waterways by implementing sound, science-based solutions to current and future environmental challenges," said Alexandra Kuchta, press secretary for the Florida Department of Environmental Protection (DEP). "The Clean Waterways Act is part of a multifaceted effort to improve and maintain the health of our waters for generations, and DEP looks forward to continuing working with partners to guarantee this success."

Action to clean up our sewage to reduce nitrogen coming into the water is a start, Lapointe said. "If we want healthy oceans, we need to go on a nitrogen diet." Emerging technologies are now available that can reduce nitrogen in sewage effluent by up to 98% and can be used anywhere without the need for a municipal collection system. Most importantly, they are as affordable as a conventional septic system, he said.

Lapointe is currently studying these systems with promising prognosis. "Our groundwater monitoring data for the On-Syte Performance system is showing a major reduction in nitrogen concentrations by this technology," Lapointe said. "This could be a game changer for Florida and beyond."



Matt Quinan, a graduate student in Beckler's lab, prepares the benthic lander for deployment.



Scientists and crew deploy the lander using an A-frame crane from a research vessel.

3X GEOCHEMISTRY AND GEOCHEMICAL SENSING LAB

Investigating the Ocean's Blue Holes

A Look Into Our Ocean's Future

Off the coast of southwestern Florida, scientists from FAU's Harbor Branch Oceanographic Institute explore mysterious deep, dark holes that extend into the seafloor almost three times deeper than the overlying water column. Called blue holes, these underwater sinkholes could help reveal what the ocean might look like under future conditions, said Jordon Beckler, Ph.D., an assistant research professor at Harbor Branch, and also a fellow at FAU's Institute for Sensing and Embedded Network Systems Engineering.

The two blue holes of interest, called Amberjack and Green Banana, display unique chemistries, including a lack of oxygen and enrichment in hydrogen sulfide and acidity – conditions expected to become more common with a gradual increase in the overall temperature of the Earth's atmosphere. "As scientists, we have a natural lab like few other known places on the planet, and certainly the eastern half of North America, to study what our future oceans might look like due to changing environmental conditions," Beckler said.

To reach these inaccessible sinkholes, the team is using state-of-the-art technologies, such as autonomous benthic landers, or underwater observational platforms, to more learn more about nutrients coming from the sediments, as well as the hydrodynamics and biology of the sinkholes.

Most recently, Beckler and his team discovered that the Green Banana is probably connected to mainland Florida through the groundwater, a discovery with potentially huge implications, Beckler said. "If we make changes on land that could affect the aquifer, via drinking water, that could affect the blue hole ecosystem – an ecological hotspot – as well as the greater Gulf of Mexico, an area prone to algae blooms and hypoxia."

Periled Peat Soils

Understanding the Effects of Wetland Loss

Formed over thousands of years from decaying organic matter, peat soils are the heart of swampy wetlands like the Everglades. But as sea levels rise and saltwater intrudes on these freshwater systems, the spongy peat crumbles and collapses, and with it comes a host of problems like habitat loss for many species, or carbon emissions in the form of greenhouse gases (like carbon dioxide and methane) that are released into the atmosphere and can accelerate global warming.

Exactly how this process happens is not well understood, and a research focus of Xavier Comas, Ph.D., professor in the department of geosciences in the Charles E. Schmidt College of Science. Comas is also leading the Environmental Geophysics Lab at FAU. Wetlands, and specifically peatlands, are one of the larger natural producers of greenhouse gases in the world, said Comas, adding that wetland loss has dramatic effects for the environment.

"We saw this first hand while conducting research during the 2015 fires in Indonesia, that resulted in 3% of the world's entire greenhouse gas emissions for that year in only three months and was linked to more than 100,000 premature deaths in the region due to smoke exposure," he said.

Comas uses near-surface geophysical methods in a variety of ways to image peatland dynamics and processes around the world – from the Everglades in Florida, and boreal systems in Maine, to the Arctic, Ecuador and Indonesia, or upcoming projects in Africa and South America. Along with colleagues, he has pioneered the use of some of these techniques (like ground-penetrating radar, GPR) to image greenhouse gas deposits in peat soils and infer gas production and release to the atmosphere. "One of the unique aspects of these methods for imaging the subsurface is that they can be deployed either directly from the ground or airborne from helicopters. Drone technology is also opening up new venues that we are exploring and were unthinkable 10 years ago," Comas said.

WILLIAM WRIGHT, PH.D

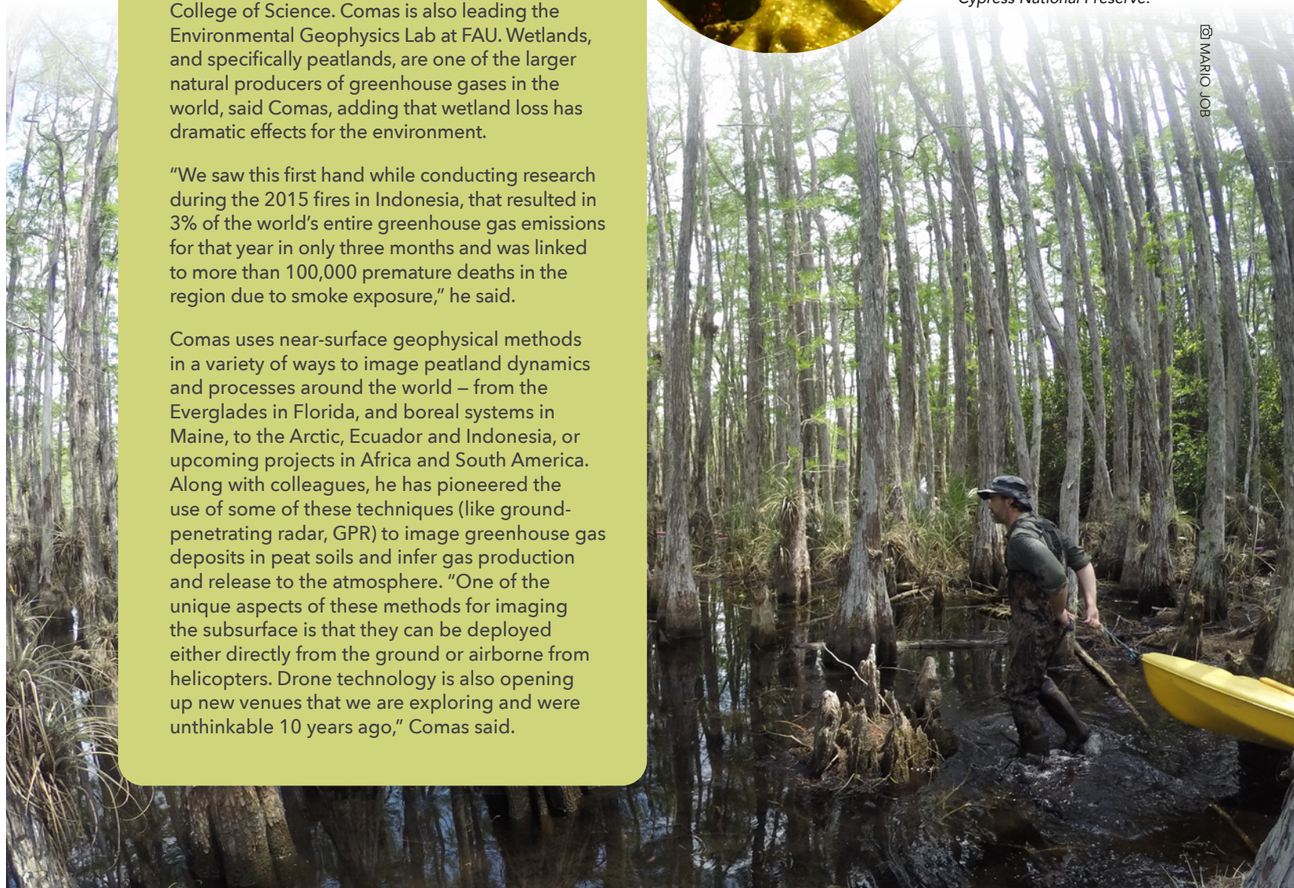
WILLIAM WRIGHT, PH.D

Above: Aerial shot of a Caribou Bog in Maine.

Left: Bubble release from peat soils underwater in the Everglades.

Below: Xavier Comas, Ph.D., in the cypress strand at the Big Cypress National Preserve.

MARIO JOB



4X 📷 JOSHUA VOSS, PH.D.

Current and former graduate students at FAU Harbor Branch Oceanographic Institute apply antibiotics to diseased corals in South Florida.

Curing Corals

Researchers Heal Deadly Coral Lesions With Common Antibiotic

For almost a decade, a lethal and highly contagious disease has impacted the corals of Florida's 350-mile coral reef, which stretches from Dry Tortugas National Park, west of the Florida Keys, to the St. Lucie Inlet in Martin County. Now, researchers at FAU's Harbor Branch Oceanographic Institute have found a promising treatment – antibiotics.

Stony coral tissue loss disease was first observed in 2014 in Miami-Dade County after a dredging event and has since spread throughout the majority of the Florida Reef Tract, as well as multiple countries and territories in the Caribbean. It's impacted more than 20 species of hard corals – those that build their own limestone skeletons – like brain, pillar and star corals. Using an amoxicillin treatment, however, the scientists could heal individual disease lesions with a success rate of about 95%, based on the results of their study, recently published in *Scientific Reports*.

"This particular disease is really impactful in terms of the rate at which it has spread geographically, the number of coral host species that it can infect and the amount of corals that are being lost to it," said Joshua Voss, Ph.D., an associate research professor at Harbor Branch, and senior author of the new study. "Those things combined made it too gut-wrenching to stand by and not try to come up with some kind of effort to combat it."

Voss and the team experimentally tested two different treatment options, chlorinated epoxy and amoxicillin on the Great Star Coral at sites 1.2 miles offshore from Lauderdale-by-the-Sea in Broward County. They chose Great Star Coral because it's one of the most important reef builders in the region. Divers got in the water and applied the treatments to lesions on the corals, which were then monitored over a period of 11 months.

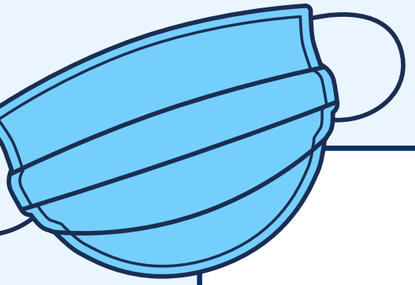
A single dose of the amoxicillin treatment had a 95 percent success rate at healing individual disease lesions. However, it did not necessarily prevent treated colonies from developing new lesions over time. The chlorinated epoxy did nothing to help or treat the disease.

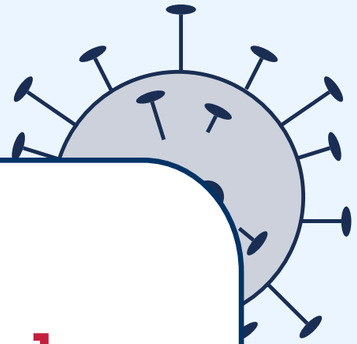
"I did not expect such a high success rate on treating the individual lesions after almost a year," said Erin Shilling, who led the study for her master's thesis research, and is currently the lab manager for Voss' team. "That was very promising."

Knowing now that this treatment can be effective, the next step is to assess any potential impacts of the antibiotics on the general bacterial community of the corals. This way, once this treatment is scaled up further, we can know we're doing so responsibly, Shilling said.

Globally, coral reefs cover nearly 110,039 square miles of the seafloor and are among the most diverse ecosystems on the planet. Without intervention, some experts estimate coral reefs will disappear entirely by 2100. Disease is just one of the many threats corals face, along with rising temperatures and changing environmental conditions.

"If we get innovative and creative, we can come up with solutions," Voss said. "But this approach is just one tool of many diverse management options for addressing coral losses overall. We need to continue work on climate change, to have any hope of corals surviving long term. We also need to continue work on water quality improvements, particularly here in Florida, as well as exploring restoration approaches and other conservation measures that can help coral reefs to stay healthy in the first place." ♦

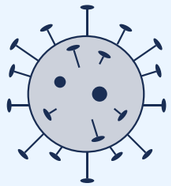




COVID-19 Registry and Repository Opens

Clinical Research Unit Seeks Volunteers for Data Collection on Response to Virus

By Judy Gelman Myers



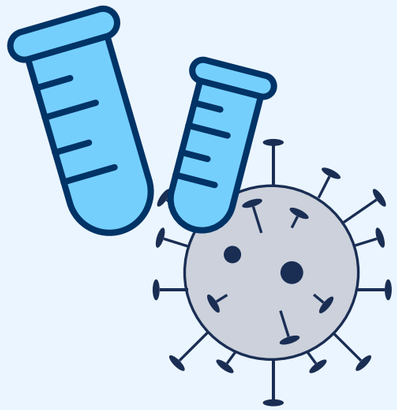
As COVID-19 cases rise and fall at varying rates throughout the world, it's become clear that the virus affects people and communities in diverse ways, complicating research efforts to fully master its complexity. To discover COVID-19's impact and further relative research, the university's Clinical Research Unit (CRU) launched a COVID-19 Registry and Repository through which they collect and store survivors' stories and blood and saliva samples.

Typically, hospitals collect this kind of information from patients under their care, but many people who had COVID-19 experienced mild symptoms and did not go to the hospital. The CRU Registry and Repository targets this population, collecting data that might otherwise have gone unnoticed. "Most studies recruit in the hospital, whereas we're reaching out to the community in general. We have people from Miami to Martin County, and about 95% of this cohort didn't even go to the doctor," said Ximena Levy, MD, MPH, director of the CRU.

The idea for the Registry and Repository, which opened in August 2020, emerged in the middle of the pandemic as members of the CRU considered what data COVID-19 researchers needed immediately to address gaps in current knowledge and what data they'll need in the future to answer questions.

Participants make two visits to the Registry and Repository to give samples, take a neurological exam and recount their personal experience of COVID-19.

Each component of the visits yield a different piece of the puzzle. The blood samples provide DNA for genome sequencing, enabling scientists to discover whether there's a genetic basis behind a person's ability to recover from COVID-19. The saliva samples will be searched for the presence of biomarkers that indicate disease development. The neurological exam will serve as a benchmark for long-term follow-up. "We're anticipating a longitudinal study to see if there are longer-term effects neurologically, but we also want to understand the genetic basis for people's response to the disease. In addition, we want to see if there are biomarkers we can follow during the course of the next several years," said Gregg Fields, Ph.D., executive director of FAU's Institute for Human Health and Disease Intervention, which supports the Registry and Repository initiative. *(CONTINUED ON PAGE 40)*



What We've Learned

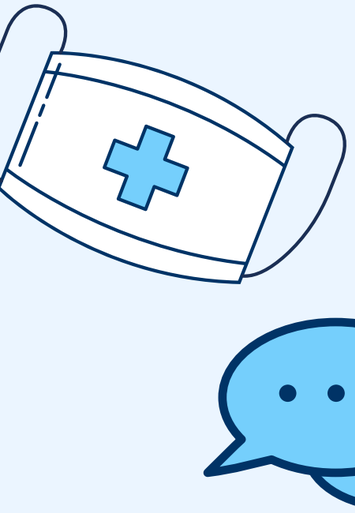
Sanitizing on the Go

Patrick Grant, Ph.D., associate professor of biomedical science, Charles E. Schmidt College of Medicine, recently designed a new compact and portable sanitizing device for multiple masks that can be used anywhere, on multiple masks simultaneously, keys and smartphones. The device uses ultraviolet light to quickly kill bacteria, yeasts, mold spores and viruses.

Grant's "portable hanging rack device" comprises an enclosed chamber housed in either a plastic container or steel compartment. Up to six masks can be positioned vertically on an internal rack. The UV light source is shielded within the housing to prevent harm to the user as its radiation deactivates the biological components of the pathogens covering the masks.

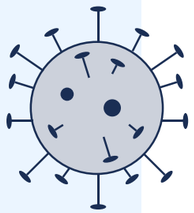
ALEX DOLCE

Patrick Grant, Ph.D., places face masks into the compact and portable sanitizing device he designed, which can be used at home or at work.



During the interview portion of the visit, participants are asked questions about how they managed their own care, whether they quarantined alone or with family members, and what access they had to the health care system. Participants' family members may also take part, especially if they quarantined together at close quarters, with a goal that responses will shed light on broader socioeconomic issues relating to health care in South Florida. "It's different if you quarantine in a seven-bedroom house than if you quarantine in a small apartment with one bedroom. We're trying to identify disparities and different responses to the disease," Levy said. "We are also including questions about people's feelings regarding stigma and discrimination when they tested positive."

The CRU is continuing to recruit participants for the registry, said Levy, adding that in order to find patterns in the data, they need a large data set. In the meantime, the CRU is unintentionally providing a much-needed service to the community: People really want to talk about their COVID-19 experiences, and the CRU is listening. ♦



What We've Learned

New Test to Curb COVID-19 Spread

To address the needs of widespread testing during the peak of the pandemic, FAU researchers developed a COVID-19 test that is highly accurate and reliable, extracts RNA with commonly available chemicals, uses samples that can be collected at home and can work in pooled samples.

The new test, spearheaded by Massimo Caputi, Ph.D., professor of biomedical science in the Charles E. Schmidt College of Medicine, gets around the global shortage of specific reagents by using TRIzol, a solution used in the extraction of RNA from cells. It is highly sensitive, commonly available and requires minimal biosafety level precautions.

The test works with saliva samples, which can be collected and sent in by the person being tested, reducing person-to-person contact.

What's more, the test answers a June 2020 call by the U.S. Food and Drug Administration, which encouraged the development of kits that test pooled samples, an approach that originated in the 1980s for testing blood supplies for HIV. The sensitivity of the FAU test makes it a perfect candidate for pooled testing, which enables the high throughput necessary to conduct more than two million tests per day.

ALEX DOLCE

Massimo Caputi, Ph.D., standing in front of a COVID-19 testing protocol machine.

What We've Learned

Flushing COVID-19

A team of researchers in the College of Engineering and Computer Science investigated aerosol droplets generated from flushing a toilet and a urinal in a public restroom under normal ventilation conditions. Aerosol droplets found in public bathrooms are considered the most prominent source of transmission for infectious diseases, including COVID-19, because restrooms are relatively confined, experience heavy foot traffic and may not have adequate ventilation. To measure the droplets, they used a particle counter placed at various heights of the toilet and urinal to capture the size and number of droplets generated upon flushing. They examined the data to determine the increase in aerosol concentration, how high the droplets rose and the impact of covering the toilet. Levels were measured before and after conducting the experiments.

Results of the study, published in the journal *Physics of Fluids*, demonstrate how public restrooms could serve as hotbeds for airborne disease transmission, especially if they do not have adequate ventilation or if toilets do not have a lid or cover. The study further suggests that incorporating adequate ventilation systems in public restrooms and other spaces would help prevent aerosol accumulation.

ALEX DOLCE

Siddhartha Verma, Ph.D., assistant professor in the department of ocean and mechanical engineering in the College of Engineering and Computer Science, is a co-author in the study that involved more than 100 rounds of flushing toilets and urinals to determine the measured aerosol levels in the ambient environment.

What We've Learned

Testing for a Safe Workplace

Researchers from the College of Engineering and Computer Science recently received a two-year $698,801 grant from the U.S. Centers for Disease Control and Prevention to test the effectiveness of various types of personal protection measures against airborne viral transmission.

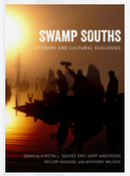
Building on their prior research, the project will result in experimentally verified computational strategies for mitigating airborne transmission of aerosolized droplets for a safe workplace environment.

Researchers will test and quantify the effectiveness of various protective measures under new American Society for Testing Materials standards and best safety practices in the workplace. They will evaluate facemasks and other personal protection equipment; physical safety barriers; interior designs of spaces; air filters, humidifiers; safe seating arrangements in a classroom setting and queuing at checkouts, as well as other measures.

ALEX DOLCE

Manhar Dhanak, Ph.D., principal investigator, chair of FAU's department of ocean and mechanical engineering, and professor and director of SeaTech, is shown with the mannequin Dhanak and his team designed to demonstrate how far aerosolized droplets travel from coughs and sneezes, which were mechanically emulated through pumping a mixture of air and mist/fog from its mouth.

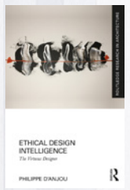
OFF THE SHELF



Swamp Souths: Literary and Cultural Ecologies

Co-Editor: **Taylor Hagood, Ph.D.,** Dorothy F. Schmidt College of Arts and Letters

Published by Louisiana State University Press, March 2020



Ethical Design Intelligence: The Virtuous Designer

Author: **Philippe d'Anjou,** Dorothy F. Schmidt College of Arts and Letters

Published by Routledge, March 2020

Interim Framework for COVID-19 Vaccine Allocation and Distribution in the United States

Co-Author: **Justin Bernstein, Ph.D.,** Dorothy F. Schmidt College of Arts and Letters

Published by The Johns Hopkins Center for Health Security, August 2020

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Co-Editor: **Maysaa Barakat, Ph.D.,** College of Education

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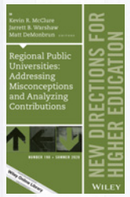
Co-Editors: **Deborah L. Floyd, Ph.D., and Cristobal Salinas Jr., Ph.D.,** College of Education

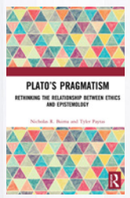
Published by Routledge , September 2020



Regional Public Universities: Addressing Misconceptions and Analyzing Contributions.

Co-Editor: **Jarrett B. Warshaw, Ph.D.,** College of Education

Published by Hoboken, NJ: Wiley Periodicals, Inc., October 2020



Plato's Pragmatism: Rethinking the Relationship between Ethics and Epistemology

Co-Author: **Nicholas R. Baima, Ph.D.,** Harriet L. Wilkes Honors College

Published by Routledge, December 2020

Public Administration and Epistemology: Experience, Power, and Agency

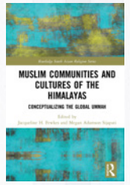
Author: **Arthur J. Sementelli, Ph.D.,** Dorothy F. Schmidt College of Arts and Letters

Published by Routledge, December 2020

Tropical Marine Mollusks: An Illustrated Biogeographical Guide

Co-Author: **Edward J. Petuch, Ph.D.,** Charles E. Schmidt College of Science

Published by Routledge and Chemical Rubber Company Press, December 2020



Muslim Communities and Cultures of the Himalayas

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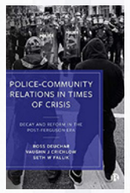

Police-Community Relations in Times of Crisis: Decay and Reform in the Post-Ferguson Era

Authors: **Ross Deuchar, Ph.D., Vaughn Crichlow, Ph.D. and Seth Fallik, Ph.D.,** College of Social Work and Criminal Justice

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The Little Book of No Consolation

Author: **Becka Mara McKay, Ph.D.,** Dorothy F. Schmidt College of Arts and Letters

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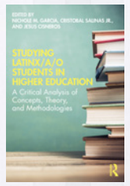

Studying Latinx/a/o Students in Higher Education: A Critical Analysis of Concepts, Theory and Methodologies

Co-Editor: **Cristobal Salinas Jr., Ph.D.,** College of Education

Published by Routledge, May 2021

Native Peoples, Politics, and Society in Contemporary Paraguay Multidisciplinary Perspectives

Edited by: **Barbara A. Ganson, Ph.D.,** Dorothy F. Schmidt College of Arts and Letters

Published by University of New Mexico Press, June 2021

A FINAL THOUGHT

The Power of the Collective

Recently, the U.S. Food and Drug Administration approved a new drug that slows the progression of Alzheimer's disease — the most common form of dementia that afflicts so many of us, our families and friends. While the approval of new drugs are an important step forward, there's much work to be done to help those suffering with dementia, and FAU researchers are stepping up to the challenge.

Working with our hospital partners, including Memorial Health Systems, our scientists are setting up investigations with other Florida state university system institutions to look at new drugs, as well as gain insights through vast troves of data. The state of Florida committed about $30 million to fund such projects. Our Institute for Human Health and Disease Intervention is well positioned to help lead some of these efforts.

In addition, FAU is also busy recruiting top researchers that focus on Alzheimer's disease. Coming to campus is a nationally renowned physician scientist that specializes in risk reduction and treatment of cognitive impairment due to Alzheimer's disease. He will be profiled in the pages of this magazine in the next edition.

The power of research collaborations has been on full display as our country and the world continues to beat back COVID-19 through vaccines. It was years of basic research that allowed scientists to quickly develop effective vaccines. Our collective scientific power, working with partners in academy and health care providers, is what will help us find new and effective treatment approaches for dementia. FAU researchers are part of that shared effort that one day will alleviate the anguish such disease causes to so many.

Daniel C. Flynn, Ph.D.
Vice President for Research

Florida Atlantic University
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CURES FROM THE DEEP

FAU Harbor Branch's Marine Biomedical Research program explores the oceans to identify new medicines with the ability to fight dreaded diseases, including pancreatic cancer, Methicillin-resistant *Staphylococcus aureus* (MRSA) and triple negative breast cancer. The drug discovery program was founded in 1984, and since then, scientists have amassed 30,000 samples of marine life to find potential disease fighting chemicals. Photograph by biomedical marine researchers on a dive in Guadeloupe.